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REMEDIAL ACTION REPORT

FOR THE

McCORMICK AND BAXTER CREOSOTING COMPANY SITE

PORTLAND PLANT

INTERIM GROUNDWATER TREATMENT SYSTEM OPERABLE UNIT (OU1)

SEPTEMBER 2000

APPROVED	DISAPPROVED
Michelle L. Pirzadeh Associate Director Environmental Cleanup Office	Michelle L. Pirzadeh Associate Director Environmental Cleanup Office
Date: 9/26/00	Date:________________

REMEDIAL ACTION REPORT
McCORMICK AND BAXTER CREOSOTING COMPANY
PORTLAND PLANT
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I. INTRODUCTION

Site Location, Setting and Operational History

The McCormick & Baxter site is located on the Willamette River in Portland, Oregon, downstream of Swan Island and upstream of the St. John's Bridge (Figure 1). The Willamette River flows to the northwest in the vicinity of the site. The site is located on an area that was constructed by placement of dredged material sometime in the early 1900s. The site, which encompasses approximately 43 acres on land and 15 acres in the river, is generally flat and lies between a 120-foot (ft) high bluff along the northeastern border and a 20-ft high bank along the Willamette River to the southwest. A sandy beach is exposed at the base of the bank except during brief periods of high river stage (generally late winter or early spring). The site is bordered by industrial properties along the river and by a residential area on the bluff. A Burlington Northern Railroad (BNRR) spur (approximately 7,500 linear ft) crosses the western portion of the property. The entire perimeter of the McCormick & Baxter property is fenced, and warning signs are posted on the fence.

The McCormick & Baxter Creosoting Company began wood-treating operations in 1944 that continued until October 10, 1991. Four retorts at the site were used for different wood-treatment processes, which included creosote in oils, PCP in aromatic oils, water based treatment (i.e., chromium and ammoniacal copper arsenate and ammoniacal copper zinc arsenate), and Cellon (PCP in liquid butane and isopropyl ether).

Between 1950 and 1965, waste oil containing creosote and/or PCP was applied to site soil for dust suppression in the central process area. Liquid process wastes were reportedly discharged to a low area near the tank farm prior to 1971. Contaminated soil was removed from this area in the mid-1980s. From 1968 until 1971, process wastes were disposed of in the former waste disposal area (FWDA) in the southwest portion of the site.

The site has a wastewater discharge outfall (Outfall 001) that was used for cooling water when the plant was operating. Contact wastewater also was discharged from this outfall in the early years of operation. Three storm water outfalls (002, 003, and 004) are also present along the river. Outfalls 001 and 002 were permitted under NPDES. Following plant shutdown, DEQ placed earthen berms around storm water collection sumps at the site as an early response action to minimize off-site discharge. Currently, storm water at the site infiltrates into the subsurface.

Three main contaminant source areas exist at the site:

- The former waste disposal area (FWDA) - located at the western corner of the site adjacent to the Willamette River.
- The central process area - the former location of the retorts, PCP mixing shed, and ACZA storage areas.

- The tank farm area (TFA) - located in the central area of the site that is the former location of the main tank farm, the large creosote tank, and several other wood treatment process-related tanks or process areas.

Other source areas include the southeast disposal trench area, located southeast of the TFA, which received overflow of oily wastes from the system pits and tank farm; miscellaneous small waste disposal areas; and monitoring well MW-1 located near the entrance to the property.

Regulatory and Enforcement History
In August 1983, McCormick & Baxter performed a preliminary site investigation (AquaResources 1983) and notified DEQ of possible off-site releases near a former waste disposal area. Subsequently, CH2M Hill was retained by McCormick & Baxter to perform a site investigation, which was completed in 1985. The investigation report concluded that soil and groundwater contamination existed at the site, but that no emergency actions were necessary to protect off-site populations.

On November 24, 1987, a stipulation and final order was signed by McCormick & Baxter and DEQ, requiring McCormick & Baxter to perform a number of remedial action activities. Not all of these requirements were completed by the time the facility was closed on October 10, 1991. DEQ conducted a Remedial Investigation and Feasibility Study (RI/FS) from September 1990 and September 1992.

DEQ's notice of a proposed remedial action for the site was published in the *Secretary of State's Bulletin* on January 1, 1993, in *The Oregonian* on January 4, 1993, and in *Between the Rivers* on March 1, 1993. Summaries of the proposed cleanup plan were mailed to the approximately 370 people on the project mailing list. Copies of the RI and FS were available for review at the St. Johns Library and North Portland Neighborhood office. The public comment period began on January 1, 1993, and ended on March 8, 1993, after being extended one month at the request of a citizen. A public comment meeting was held on February 2, 1993, though no verbal testimony was received. DEQ provided written responses to comments received following completion of the public comment period.

DEQ elected not to finalize the proposed remedial action at the McCormick & Baxter site in 1993 due to the pending addition of the site to the National Priorities List (NPL) by the United States Environmental Protection Agency (EPA). DEQ instead began to implement a number of interim remedial actions (IRAs), which were elements of the 1993 DEQ proposed plan, while awaiting a final decision from EPA on inclusion of the McCormick & Baxter site on the NPL. The McCormick and Baxter site was added to the NPL on June 1, 1994.

Since completion of the RI/FS in 1992, DEQ has conducted several IRAs and additional site characterization. Based on implementation and/or completion of the IRAs, collection of additional site data since the 1992 FS and experience gained at other wood-treating sites, DEQ chose to revise the 1992 FS to incorporate new data and updated remedial alternatives. The Revised FS Report describes updated remedial action alternatives for the McCormick & Baxter site and incorporates IRAs conducted since the 1992 FS.

The Proposed Plan describing DEQ's and EPA's preferred remedy was issued on October 30, 1995. The public comment began on November 6, 1995, and ended on January 15, 1996. A public meeting was held on November 28, 1995. After considering the comments received during the public comment period, DEQ and EPA issued the Record of Decision (ROD) specifying the selected remedy in March 1996. DEQ conducted public meetings on April 23 and May 29, 1996, to discuss the ROD and the selected remedy.

This Remedial Action Report describes the selected remedy for interim groundwater and NAPL treatment at the McCormick and Baxter site. For the purposes of this Remedial Action Report, the interim groundwater extraction and treatment system, which was operating at the time of ROD issuance has been designated Operable Unit OU1. Other operable units at the site and which were addressed by the 1996 ROD include soil (OU2), final groundwater (OU3) and sediment (OU4).

Nature and Extent of Groundwater Contamination

Contaminants on the site are chemicals used in the wood preserving industry, including PAHs, about 85 percent of which is composed of creosote constituents, PCP, arsenic, chromium, copper, and zinc. Polychlorinated dibenzo-*p*-dioxins and dibenzofurans (dioxins/furans), which are trace constituents of PCP, were also found in groundwater at the site.

Groundwater

The main contaminants in groundwater are PAHs, PCP, and metals associated with wood-treating solutions. The primary source areas of the groundwater contamination include the TFA and creosote tank, the FWDA, the central process area, and, to a limited extent, a localized area in the southeast waste disposal trench and an unknown source area near MW-1. Wood-treating contaminants are not generally soluble in water, and the contaminants either float on the water table or continue to sink depending on the density of the waste compared to that of water. Groundwater quality at the site has also been impacted by dissolved-phase contaminants.

Releases of NAPL contaminants from the main source areas at the site, in particular the TFA and FWDA, have primarily affected the shallow aquifer. As the pure-phase NAPL has migrated toward the river, it has also spread downward vertically, affecting a layer of sand adjacent to the river. Two distinct NAPL plumes are present at the site, one in the TFA and the other in the FWDA. These contaminant plumes contain LNAPL and/or DNAPL that primarily consists of creosote compounds, as well as dissolved-phase contaminants. Smaller NAPL plumes are present near MW-1 and the former location of Butt Tank 1 in the southeast corner of the site.

The FWDA NAPL plume affects approximately 4 acres of soil and 5 acres of sediment. The origin of this plume is waste oils, storm water from system pits, and other liquid wastes that were disposed in the FWDA. This mixture migrated vertically to the water table (approximately 30 feet BGS) and then laterally toward the river, as both LNAPL and DNAPL. Monitoring and extraction wells have contained up to 8 feet of LNAPL and 21 feet of DNAPL, with visible DNAPL present in soil samples collected at depths up to 88 feet BGS.

The TFA plume affects approximately 8 acres of soil and 6 acres of sediment. The origin of this plume is the former tank farm, large creosote tank, creosote retorts, butt tanks, and southeast waste disposal trench, which either had periodic spills or were used for disposal of waste oils (creosote and PCP) and other liquid wastes. This mixture migrated vertically to the water table (approximately 30 feet BGS) and then laterally toward the river, spreading as both LNAPL and DNAPL. Wells in this NAPL plume have contained up to 3 feet of LNAPL and 10 feet of DNAPL, with visible DNAPL present in soil samples collected at depths up to 62 feet BGS.

II. OPERABLE UNIT BACKGROUND

OU1 generally consists of the groundwater and NAPL extraction, treatment and monitoring system installed and operating at the site as an Interim Action at the time of ROD issuance. The ROD provided that this "interim groundwater" system would continue to operate and be maintained while undergoing upgrading and enhancements to attain the full functional ability to meet the groundwater Remedial Action Objectives (RAOs) for the site.

The principal components of the interim groundwater system included:

- Installation of an interceptor trench downgradient from the tank farm area to recover light nonaqueous-phase liquid (LNAPL);

- Installation and monitoring of groundwater wells to further delineate the extent of NAPL contamination;

- Recovery of NAPL from extraction and monitoring wells; and

- Design, construction and operation of a pilot treatment system to treat NAPL-contaminated groundwater.

Dissolved–phase groundwater contamination in the shallow aquifer at the site is associated with the NAPL plumes migrating from the tank farm and former waste disposal areas. Dissolved-phase groundwater contaminants include PAHs, PCP, and metals. Groundwater at the site is not currently used for drinking water.

The Remedial Action Goals (RAOs) for the interim groundwater system at the site included:

- Stabilizing or limiting the migration of contaminants at the site to control immediate threats to public health and safety and the environment; and

- Reducing the mass of groundwater contaminants through "source control" measures, such as NAPL extraction.

In addition, the final groundwater remedy (OU3) included RAOs which were relevant to the continuing operation of the interim groundwater system, including:

- Preventing human exposure to or ingestion of groundwater with contaminant concentrations in excess of state and federal drinking water standards or protective levels:

- Minimizing further vertical migration of NAPL to the deep aquifer;

- Preventing groundwater discharges to the Willamette River that contain dissolved contaminants that would result in contaminant concentrations within the river in excess of background concentrations of in excess of water quality criteria for aquatic organisms;

- Minimizing NAPL discharges to the Willamette River beach and adjacent sediment to protect human health and the environment; and

- Removing mobile NAPL to the extent practicable to reduce the continuing source of groundwater contamination and potential for discharge to Willamette River sediment.

The ROD describes the general principle of the enhancements to be made to the interim groundwater system. The intent is to gravity separate NAPL and groundwater extracted from selected NAPL/groundwater extraction wells. The system was to operate with a flow rate of at least 30 gallons per minute, and be designed for continuous operation. The ROD specified that the groundwater system was to treat any system effluent water to the NPDES discharge criteria presented as Table 1. NAPL was to be collected from the system separators and held in an on-site storage tank, pending disposal in accordance with applicable hazardous waste regulations.

Table 1
NPDES DISCHARGE LIMITS

Parameter	Monthly Average	Daily Maximum
Flow	-	43,200 gallons/day
Arsenic	80	120
Chromium (IV)	19	28
Chromium (III)	350	500
Copper	20	30
Zinc	190	280
Pentachlorophenol	22	33
Total PAHs	1,700	2,500
PH	6.5 - 8.5	6.5 - 8.5

Because of the extensive NAPL contamination, it is not technically practicable to restore the groundwater aquifers under the site to drinking water quality; therefore, site-specific contaminant concentration limits that are protective of the environment were developed. These protective ACLs were developed in accordance with CERCLA Section 121(d)(2)(B)(ii) for dissolved contaminants in groundwater discharging to the Willamette River. Section 121 provides that ACLs may be used at a Superfund site when:

- Groundwater has a known projected point of entry to subsurface water;

- There is no significant increase in contaminant concentrations in the surface water at the discharge point or any point at which contaminants are expected to accumulate; and

- There are measures such as institutional controls that prevent human exposure to groundwater contaminants that are above health-based levels.

DEQ and EPA determined that these provisions of CERCLA have been met for the dissolved constituents in groundwater at the site. Further, DEQ and EPA determined that active restoration of the aquifers to non-zero Maximum Contaminant Level Goals (MCLGs) or Maximum Contaminant Levels (MCLs) is technically impracticable due to the extensive NAPL contamination of the saturated zone beneath the site and the river sediment. DEQ and EPA also determined that the risk from potential degradation products in the groundwater can be managed through institutional controls, and that no significant increase of their degradation compounds have been found in surface water and no significant increase of contaminants will occur in sediment from groundwater. The ACLs were established to protect aquatic organisms based on EPA/State water quality criteria and will not result in statistically significant increases of contaminant concentrations above background in the Willamette River. The ACLs for groundwater are presented as Table 2.

Table 2
ACLs for Groundwater (Shallow Aquifer)

Analyte	Groundwater Concentration (mg/L)
Total PAHs	43
Pentachlorophenol	5
Dioxins/Furans	2×10^{-7}
Arsenic(III)	1
Chromium(III)	1
Copper	1
Zinc	1

III. CONSTRUCTION ACTIVITIES

A pilot-scale wastewater treatment system was installed at the site in an effort to separate NAPL and treat groundwater removed through total fluid extraction efforts in the TFA. In addition, pure-phase NAPL extraction was performed in the TFA and FWDA. Wells in the FWDA were used for pure-phase NAPL extraction only as groundwater was not extracted. The FWDA wells were not connected to the pilot-scale treatment system in the TFA.

The goal of the NAPL extraction was to remove and deplete the NAPL pools to residual levels (to the extent possible) to minimize or prevent active migration into the sediments and Willamette River. The residual level (percentage of NAPL left in pores) necessary to totally prevent pool migration in unknown. However, wells were pumped (either through total fluids or pure-phase extraction) until visible oil was not present in the discharge. Wells were monitored periodically after that time to assure an active pool had not re-accumulated at a given well location.

Total Fluids Extraction System

During total fluids pumping, selected extraction wells were pumped on an 8-hour-per-day, 5-day per week schedule. Total fluids extracted from the wells were treated at the pilot-scale wastewater treatment system located in the TFA shop building. Total fluids were pumped with individual wells producing from approximately 0.25 to 3 gpm each. The total pumping rate did not exceed 10 gpm, the rate at which the treatment plant operated. The choice of wells to be pumped at a given time was decided in the field by the treatment system operators. Wells selected for extraction was based on the presence of measurable NAPL in the wells.

Primary pumping wells included EW-1, EW-4, EW-5, EW-7, EW-18, and MW-1. These highly contaminated wells in the TFA have historically yielded substantial NAPL during total fluids extraction. These wells were pumped at a total of 8 gpm of NAPL/water to the treatment system.

Description of Total Fluids Extraction

The total fluids extraction system consisted of extraction wells equipped with pneumatic and electric submersible pumps designed to extract creosote and related organic fluids found as NAPL. The design of the system allowed for extraction of NAPL and water at relatively low sustainable rates over along period of time. System design was flexible, allowing multiple wells to be pumped simultaneously. Gate valves controlled electric and air pump rates. The total fluid removed from each well was pumped to a central transfer tank, then to the wastewater treatment plant. The system design minimized the labor required for system operation and maintenance. A conceptual design of the total fluids extraction system is presented in Figure 2.

Two types of pumps were used in the total fluids extraction system, which included an electric submersible pump, which is designed to pump light oils and water, and an air-driven pump. The submersible pump was a 115-volt 2-wire pump, and did not require a starter box to control the pump. The air-driven pump was designed to pump fluids ranging from water to heavy oils. The pump was operated by air, but did not need an external controller because an internal float controlled the pump, which was turned-on when the pump was full and shut off when the fluids had been discharged. Air pressure to the pump was regulated by a small air regulator/filter that was placed at the well head. The pump operated a minimum of 40 pounds per square inch (psi) and a maximum pressure of 125 psi.

Fluids discharged from the extraction wells were piped to the transfer tank through polyethylene piping. The fluids were collected in the transfer tank located centrally in the TFA. The transfer tank was used to minimize the amount of head required to lift fluid from the pump to Tank 1 in the treatment building. The oil water was transferred from the transfer tank to Tank 1 with an air-driven double-diaphragm pump. This pump could be operated manually, intermittently throughout the day as the tank was filled, or left running at a continuous slow rate. The pump could operate dry and not be damaged. Air supplied to the pump was filtered at the air inlet on the pump.

Pure-Phase Extraction

Pure-phase extraction in the TFA and FWDA consisted of extraction wells equipped with pneumatic pumps designed to extract creosote and related organic fluids found as both LNAPL and DNAPL. System design was flexible allowing wells to be pumped individually, or groups of up to 12 wells at one time. Timers controlled pumping rates, and both pumps and timers operated on compressed air. Creosote was collected in a storage tank in the FWDA that allowed for disposal on a periodic schedule. Groundwater was not extracted in the FWDA wells.

A diagram of pure-phase extraction is presented in Figure 3. The extraction system included an air pressure vessel, controller unit, and pumps. Both networks were self-contained except for the compressed air, which was supplied by a 5-horsepower portable compressor. Both LNAPL and DNAPL could be extracted by varying the depth of the pump. Pump intakes for LANPL extraction were set at the top of the water column to allow skimming of the floating product. Pump intakes for DNAPL were set at the bottom of the well sump, which served as a collection vessel for creosote that migrated into the sandpack and well screen and sank downward in the well bore.

Pure-phase NAPL extraction was limited to weekly purging of NAPL from wells. In the TFA, total fluids extraction was the primary method to recover NAPL. Past extraction data indicated that weekly purging was as efficient as continuous, automated pumping of pure NAPL (i.e., without pumping water). Efforts to continuously pump selected extraction wells resulted in the recovery of large volumes of groundwater, which required treatment, relative to the amount of pure NAPL.

Pilot Wastewater Treatment System

The pilot treatment system was designed to evaluate the removal of organic contaminants, particularly NAPL and any incidental inorganic contaminants (primarily metals) from groundwater extracted from the TFA. The plant consisted of units for influent, dissolved air flotation (DAF), equalization, filtration, ion exchange (for metals removal), and treatment of dissolved/colloidal organic compounds using granular activated carbon (GAC). Effluent was held in two storage tanks prior to discharge. The general layout of the treatment plant is shown in Figure 4. A plant schematic is shown in Figure 5.

The treatment plant was designed to operate at a flow capacity of 5-10 gpm. This relatively low-flow system was selected for pilot operation because the NAPL extraction wells had small yields (less than 3 gpm) and the effective lifetime of a given well for NAPL production is unknown.

Description of Treatment System

Influent Tank

The influent tank (Tank 1) was a 20,000-gallon "T" style Bake tank that received extracted groundwater/NAPL from the transfer tank located in the TFA. Tank 1 was equipped with two elevated weirs to allow for skimming and a stepped bottom for the separation of NAPL. DNAPL was drawn off for disposal after sufficient quantities have accumulated. Tank 1 provided sufficient volume to keep the DAF system operating at 10 gpm. Water was gravity-fed rather than pumped to the DAF system to prevent emulsification; however, the tank was equipped with a diaphragm pump to supply the DAF system with a constant flow if the water level dropped.

Dissolved Air Flotation

The DAF system provided for additional removal if NAPL (particularly neutral-buoyant NAPL) not removed in Tank 1. A gate valve regulated the water as it entered the system. The water entered the first of two mixing tanks where the chemical WWA-40 was added. The water flowed into the second mixing tank where the polymer WW-1100 was added and the pH was adjusted with caustic soda. At this stage, the NAPL was flocculated and separated from the water. The water entered the Tricell tank, which mechanically combined finely divided air bubbles into the water. The microbubbles attached to the particulate and floated the flocculent to the surface. Additional polymer was added to the first and third cells of the Tricell to promote particulate removal. A rotating skimmer removed the floating flocculent to a sludge box. Sludge was pumped with a diaphragm pump to the sludge tank (Tank 4). Treated water was gravity-discharged from the bottom of the third cell into a 220-gallon transfer tank where a pump transferred the water to Tank 2.

Sludge Tanks (Tank 4)

The sludge tank was a 6,000-gallon chemical-resistant poly tank that received sludge from the sludge box.

Flow Equalization Tank (Tank 2)

The flow equalization tank received treated water from the DAF unit. This tank provided flow equalization for the treatment plant prior to further treatment.

Filtration Units
Water was pumped from Tank 2 and regulated by a gate valve prior to being filtered through filtration housings. The cartridge filters (two in series) provided for removal of suspended solids from water prior to introduction to the ion exchange column and GAC canisters. The first housing contained a 50-μm-filter bag. The second filter housing contained a 5-μm filter bag. The filter housings were equipped with pressure gauges to indicate when the filter bags were becoming clogged.

Ion Exchange Column
After filtration, when needed, the water was diverted through the ion exchange column to remove dissolved metals to acceptable levels. This column was limited to a maximum flow rate of 10 gpm.

Granulated Activated Carbon (GAC) Unit
After the ion exchange column, the water entered the granular activated carbon (GAC) system. The GAC system (two 85-gallon drums in series) provided for removal of dissolved or colloidal organic contaminants prior to discharge. Each carbon unit was monitored for breakthrough and replaced once the carbon was saturated. The carbon canisters were equipped with pressure gauges to indicate canister pressure.

Effluent Storage Tanks (Tanks 3a and 3b)
The effluent storage tanks received treated water from the filters, ion exchange column, and GAC system. These tanks provided storage of treated water for evaluation prior to discharge under NPDES Permit conditions. Water was discharged to a surface water drain near the treatment plant after testing to determine whether water quality criteria specified in the discharge permit were met.

IV. CHRONOLOGY OF EVENTS

Date	Event
September 1990	DEQ begins RI/FS process at the site.
February 1993	Pure-phase NAPL extraction system in operation in the TFA and FWDA. Total fluids extraction operational in the TFA
December 1994	Pilot Wastewater Treatment system installed in the TFA.
October 1995	Revised RI/FS and Proposed Plan for the M&B site released to the public.
March 1996	ROD signed.
Ongoing	NAPL extraction and groundwater monitoring.

V. PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL

The overall performance of the treatment systems has functioned at extracting mobile NAPL. As discussed in the ROD, the overall objective of the enhanced NAPL removal was to capture mobile NAPL in the immediate vicinity of the extraction wells, and not maintain hydraulic control of NAPL site-wide.

VI. FINAL INSPECTION AND CERTIFICATION

Inspections

RA contract inspections were not performed during the treatment systems installation or subsequent operation. However, design and installation work plans and reports were reviewed and approved by DEQ and EPA prior to implementation. The only institutional control implemented for OU1 is restrictions on groundwater use.

Health and safety

All contractors and consultants performing work on the site must comply with health and safety guidelines. Health and safety guidelines specified in the site *Health and Safety Plan* are strictly enforced at the site by Ecology and Environment, Inc. (ODEQ's contractor). There have been no lost-time injuries during the implementation of the remedial action.

VII. OPERATION AND MAINTENANCE

Operation and maintenance of the pilot-scale treatment system in the TFA included replacement of GAC, anthracite clay vessels, and particulate filters as needed, as well as regeneration of ion-exchange columns. NAPL was removed on a quarterly basis from the NAPL setting tanks. Treatment system monitoring and adjustment were performed on a weekly basis. Constant adjustments to the treatment system were required during operation. No other problems or concerns had been raised during treatment system operation and maintenance.

VIII. SUMMARY OF PROJECT COSTS

Based on the operation and maintenance and the amount of water treated from the TFA system, the estimated unit costs for groundwater treatment were $3.17 per gallon of water treated from 1993 to 1995. Capital costs for OU1 consisted of total fluids and pure-phase NAPL extraction and installation of the Pilot Treatment System in the TFA. Table A3 in Appendix A provides an annotated breakout of the actual costs.

IX. OBSERVATIONS AND LESSONS LEARNED

- The pilot-scale treatment system installed in the TFA was effective at treating contaminated groundwater extracted from wells in the TFA. However, the treatment system (i.e., DAF) required extensive manual labor to operate and material costs were high.

- Enhanced NAPL extraction is only effective in the immediate area of the extraction wells. The treatment system and NAPL extraction activities were not effective at hydraulic control of NAPL pools. Mobile NAPL continued to migrate to beach sediments during total fluids and pure-phase NAPL extraction and operation of the treatment system.

X. CONTACT INFORMATION

Major design and remediation contractor addresses and phone numbers:

Al Goodman is the EPA project manager in charge of the site:

EPA
Al Goodman
811 S.W. Sixth Avenue
Portland, Oregon 97204
(503) 326-3685

ODEQ lead the environmental cleanup at the site:

Oregon Department of Environmental Quality
William Dana
811 S.W. Sixth Avenue
Portland, Oregon 97204
(503) 229-6530

ODEQ used he following contractor for oversight of the construction and operation and maintenance of the TFA and FWDA treatment systems:

Ecology and Environment, Inc.
John Montgomery
333 S.W. Fifth Avenue, Suite 608
Portland, Oregon 97204
(503) 248-5600

The contractor for DEQ used the following subcontractor for construction, operation and maintenance of the treatment systems:

ADT Environmental Solutions
Ken Pepperling
1210 Northeast Oregon Street
Sherwood, Oregon 97140

APPENDIX A—REMEDIAL ACTION REPORT
McCORMICK AND BAXTER CREOSOTING COMPANY
PORTLAND, OREGON
INTERIM GROUNDWATER SYSTEM (OU1)

TABLE A1—CHARACTERISTICS AND SITE CONDITIONS

Parameter	Site Conditions	Measurement Procedure/Comment
Environmental Setting		
Air Temperature (°F)	69 (Average for 1993)	Portland International Airport Data
Humidity (%)	36 (Average for 1993)	Portland International Airport Data
Barometric Pressure (inches of mercury)	30.01 (Average for 1993)	Portland International Airport Data
Average Rainfall (inches)	40.78 (1993) 41.26 (1994)	Portland International Airport Data
Groundwater Aquifers		
Aquifer classification	Shallow, intermediate and deep	Well data
Aquifer Properties		
Hydraulic conductivity	0.15 ft/day in shallow aquifer	Soil testing data
Porosity	0.30	Soil testing data
Groundwater flow direction	West southwest in the shallow, intermediate, and deep aquifer.	Quarterly groundwater monitoring and sampling data.
NAPL Properties		
Density	1.01 to 1.07 grams per cubic centimeter	Pure-phase NAPL testing.

Note: not applicable. Measurement procedures are only for those parameters where different procedures are available.

APPENDIX A—REMEDIAL ACTION REPORT
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INTERIM GROUNDWATER SYSTEM (OU1)

TABLE A2—OPERATING PARAMETERS

Parameter	Site Conditions	Measurement Procedure/Comment
System Parameters		
Groundwater pH	6.0 to 6.5	Quarterly groundwater monitoring and sampling data.
Groundwater temperature	11.0 to 12.0 °C	Groundwater monitoring data
NAPL and Groundwater extraction rates	0.25 gpm from extraction wells	Pulse counters used on pneumatic pumps at TFA and FWDA.
Effluent sampling	pH = 6.0 to 7.0	Quarterly groundwater monitoring and treatment system O&M.

Note: not applicable. Measurement procedures are only for those parameters where different procedures are available.

APPENDIX A—REMEDIAL ACTION REPORT
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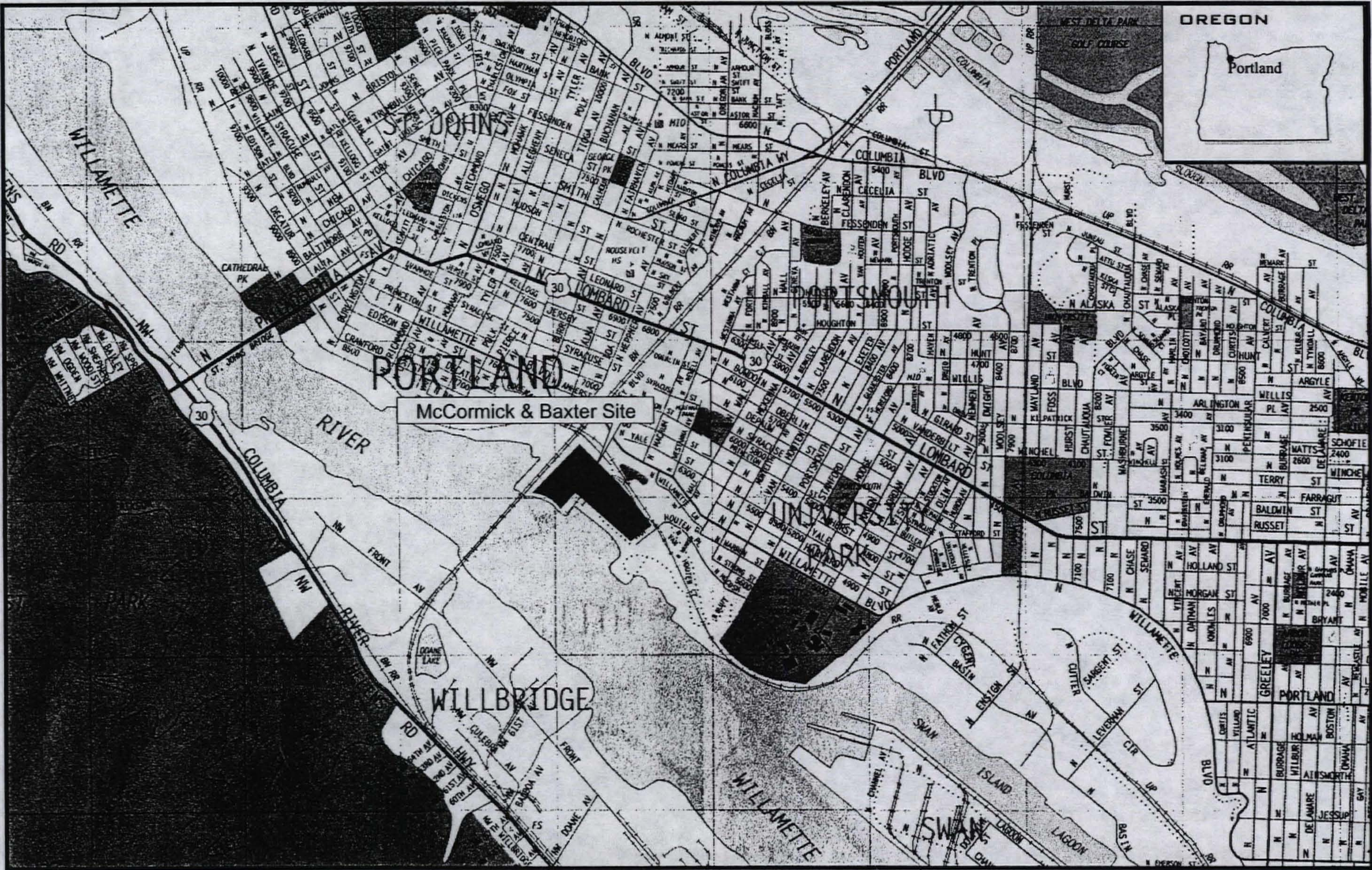
INTERIM GROUNDWATER SYSTEM (OU1)

TABLE A3—DETAIL OF PROJECT COSTS

Cost Element	***Cost (2000 $$)**	
RA Capital Costs:		
Installation of TFA Pilot Treatment System	$175,000	
Installation of monitoring wells	$95,000	
Pumps, controllers, storage tanks	$25,000	
Total Capital Costs		$295,000
RA Operating Costs (1994 – 1995):		
Operation and Maintenance of Treatment System		
Direct Labor	$175,000	
Groundwater monitoring (analytical)	$40,000	
NAPL Disposal Costs	$15,000	
Equipment Rental	$7,500	
Incidentals	$20,000	
Total RA Operating Costs		$257,500
Total RA Cost		$552,500
Projected O&M Cost (1995 – 1996)		
O&M Oversight and operating costs		$220,000
Groundwater monitoring (analytical)		$80,000
Total Projected O&M Costs		$300,000

* Costs were adjusted from 1993 $$ using 7% annual inflation rate.



ecology and environment, inc.
International Specialists in the Environment
Portland, Oregon

McCORMICK & BAXTER CREOSOTING CO.
PORTLAND, OREGON

FIGURE 1

SITE LOCATION MAP

0 .25 .5
Approximate Scale in Miles

Drawn By:	Date	TDD/Job No.	Dwg. No.
AES	12-9-98	OH4270	OH4270F22

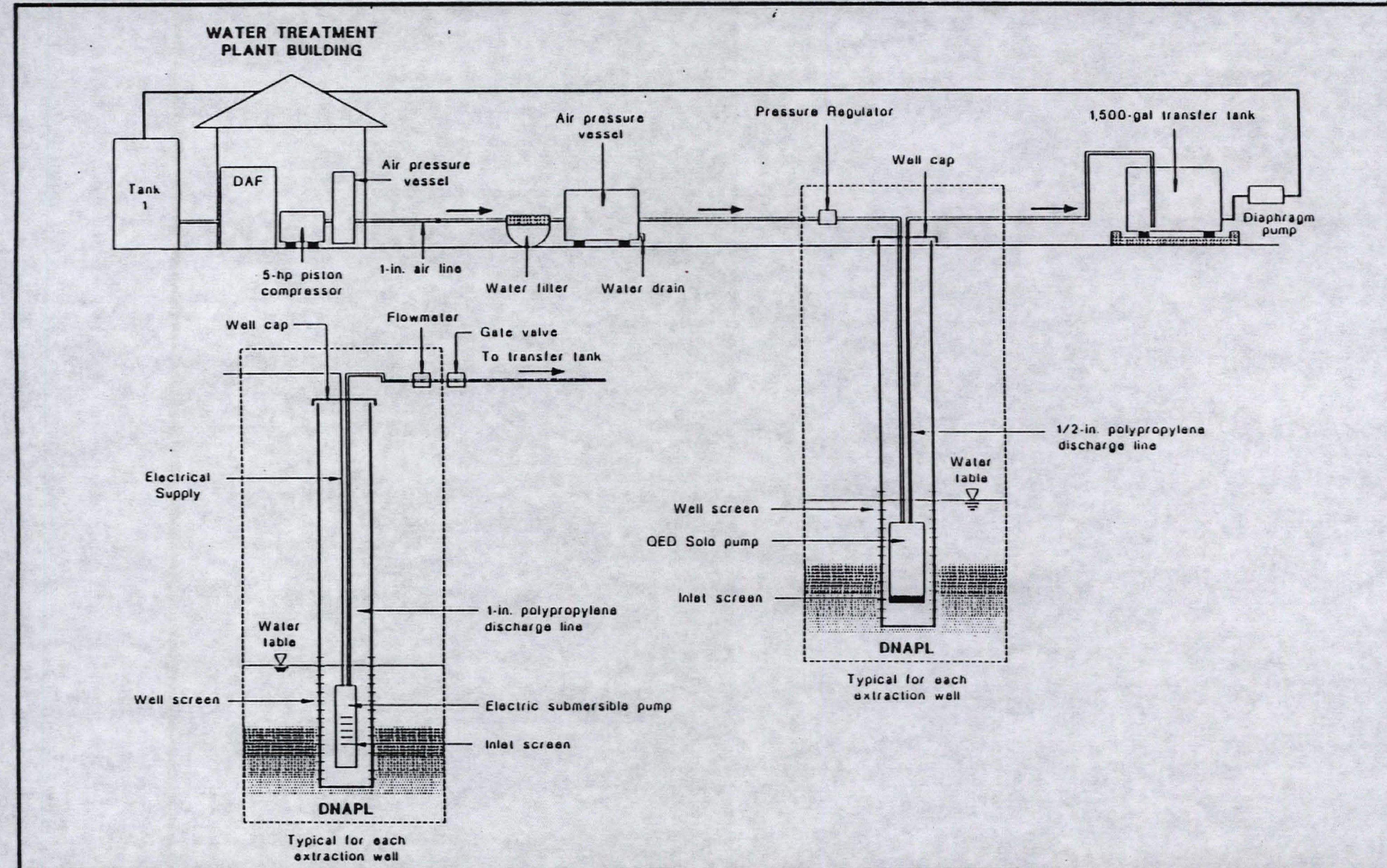


Figure 2. Conceptual diagram for total fluids recovery system.

C4120304\O&M FLUIDREC.DWG L 121694

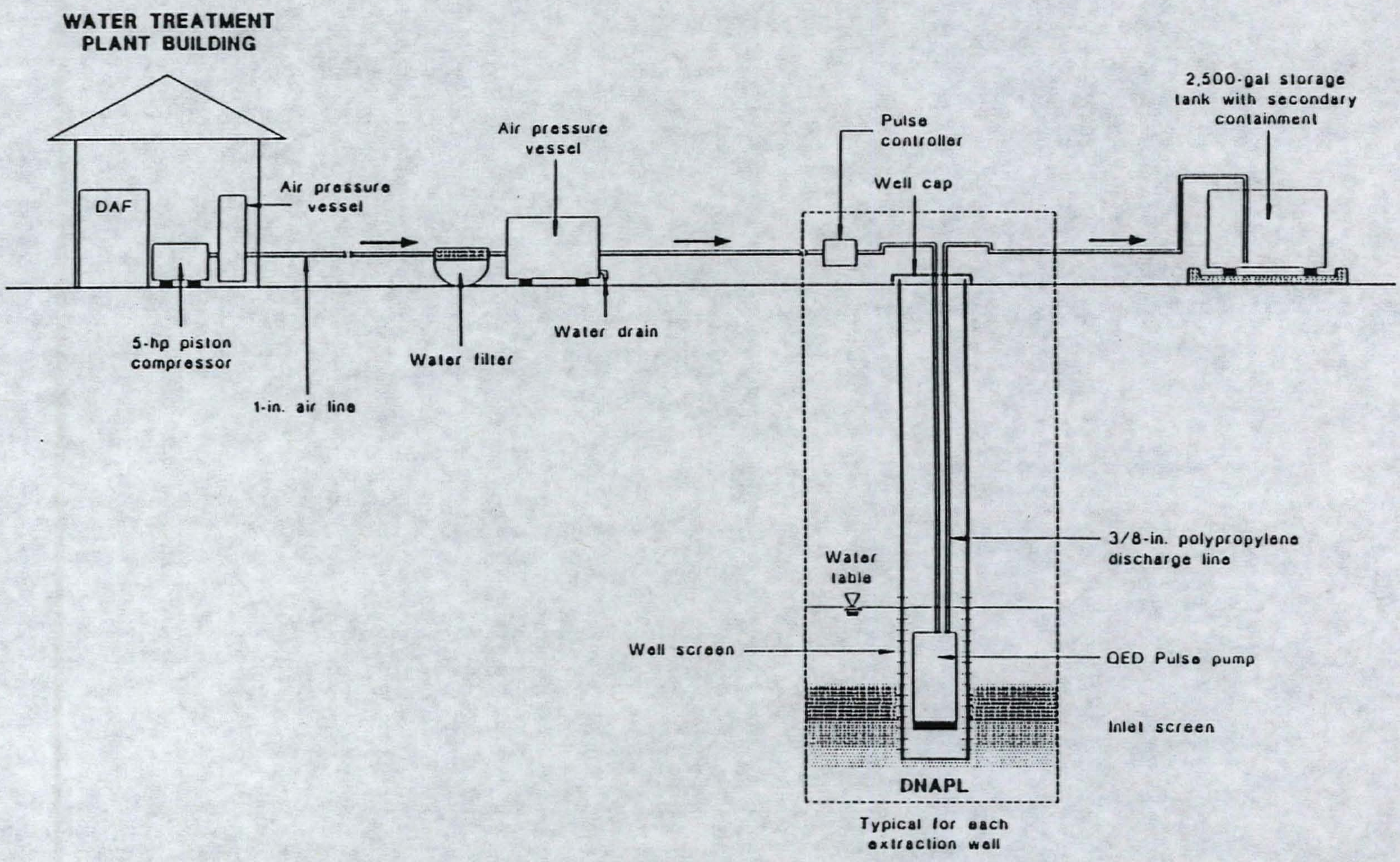


Figure 3 Conceptual diagram for pure-phase NAPL recovery system.

C4120304\O3M NAPL REC.DWG L 121294

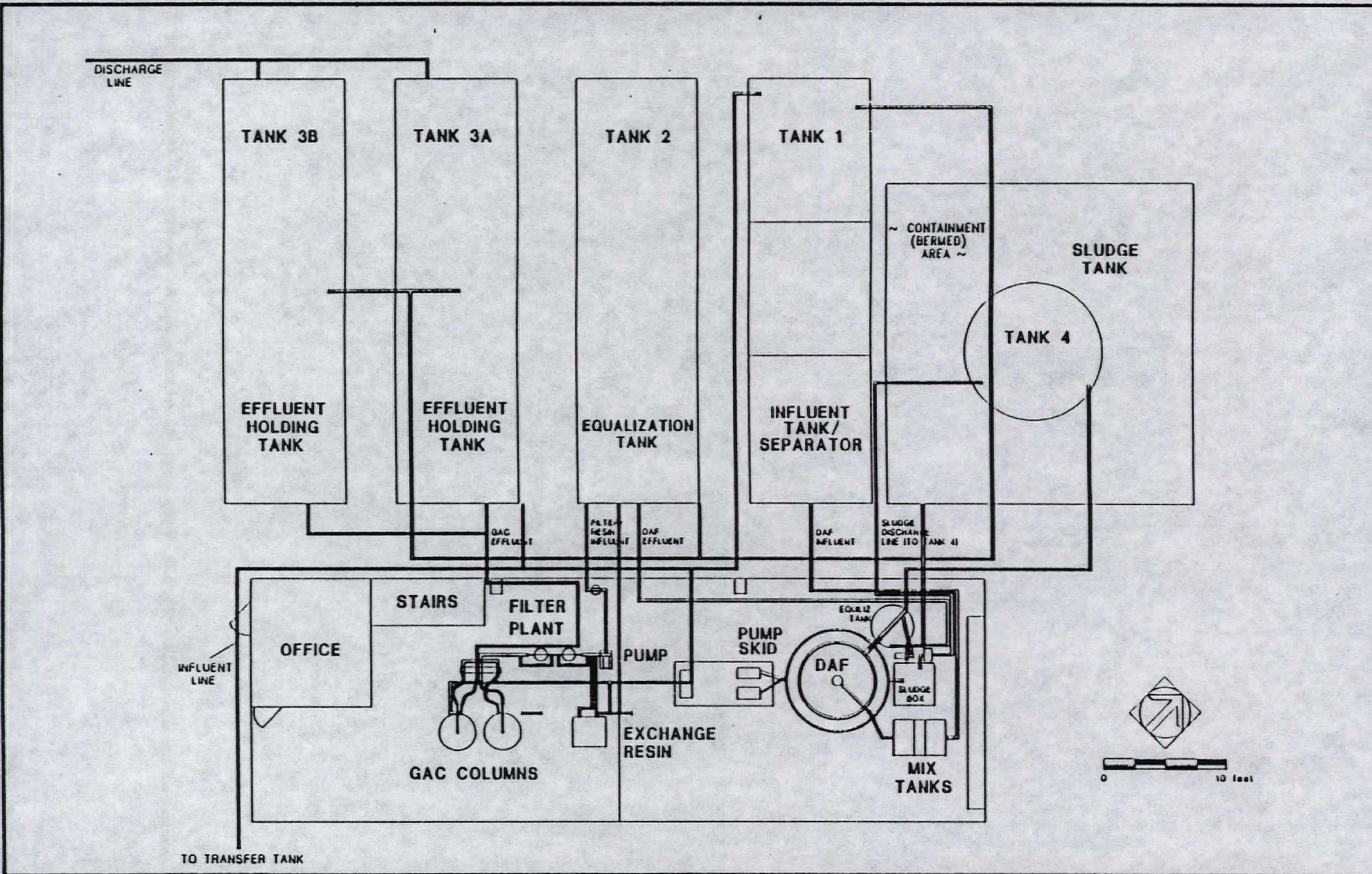


Figure 4 . Wastewater treatment plant layout.

C4120304/O&M PLANT.DWG L 121694

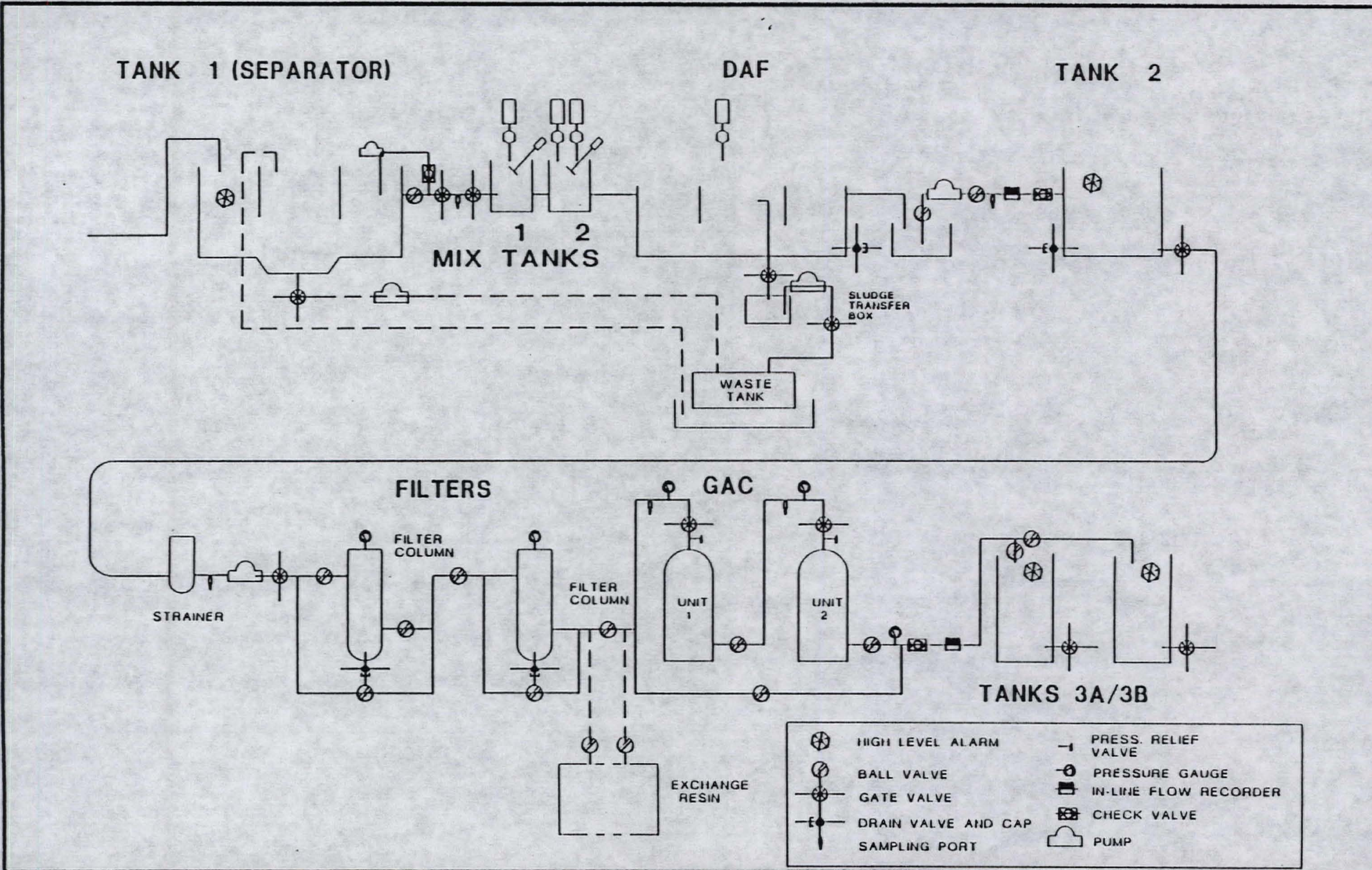


Figure 5' Wastewater treatment plant schematic.

C4120310 SITE.DWG L 0394

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
OREGON OPERATIONS OFFICE
811 S.W. 6th Avenue
Portland, Oregon 97204

September 21, 2000

MEMORANDUM

SUBJECT: Remedial Action Report
McCormick & Baxter Creosoting -Portland
Interim Groundwater Treatment System - OU1

FROM: Al Goodman
Remedial Project Manager

TO: Michelle L. Pirzadeh, Associate Director
Environmental Cleanup Office

THROUGH: Lori Cohen, Manager
Site Cleanup Unit 3

The purpose of this memorandum is to request your approval of the attached Remedial Action Report for the Interim Groundwater Treatment System Operable Unit at the McCormick and Baxter Creosoting site.

The attached report documents the completion of groundwater cleanup actions which were implemented by the Oregon Department of Environmental Quality (DEQ) as an Interim Action. Groundwater cleanup activities are continuing at the site under the Final Groundwater Operable Unit (OU3).

The Remedial Action Report has been prepared in accordance with the January 2000 *Site Closeout Procedures Guidance*. I recommend your approval of the report.

CONCURRENCE				
SIGNATURE	Al Goodman	LC		
SURNAME	A. Goodman	L. Cohen		
DATE	9/21/00	9/25/00		

Please return signed report to: Al Goodman
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